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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/505,460	09/02/2004	Norio Miyaura	258317US0PCT	3019
22850 7590 07/19/2007 OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER SHIAO, REI TSANG	
			ART UNIT 1626	PAPER NUMBER
			NOTIFICATION DATE 07/19/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary

Application No.

10/505,460

Applicant(s)

MIYAURA ET AL.

Examiner

Rei-tsang Shiao, Ph.D.

Art Unit

1626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 2 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 09/02/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This application claims benefit of the foreign application: JAPAN 2002-61044 with a filing date 03/306/2002. However, an English-translated version of the foreign priority document has not been filed to the Office, the foreign priority has not been granted.
2. Claims 1-11 are pending in the application.

Information Disclosure Statement

3. Applicant's Information Disclosure Statement, filed on September 02, 2004 has been considered. Please refer to Applicant's copy of the 1449 submitted herein.

Responses to Election/Restriction

4. Applicant's election with traverse of election of Group I claims 1 and 3-11, in part, in the reply filed on May 24, 2007 is acknowledged. As a single disclosed species, i.e., Example 1-6, is also acknowledged. The traversal is on the grounds that restriction is only proper if the claims of the restricted groups are either independent or patentably distinct and there would be a serious burden placed on the Examiner if restriction is not required, and MPEP §803 is cited.

This is found persuasive, in part, and the reasons are given *infra*.

Claims 1-11 are pending in the application. The scope of the invention of the elected subject matter is as follows.

Claims 1 and 3-11, in part, drawn to processes of making compounds of formula

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(V) or (VI), wherein the variable X represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z independently represents $-\text{CH}=\text{}$ thereof.

The claims 1-11 herein lack unity of invention under PCT rule 13.1 and 13.2 since the compounds defined in the claims lack a significant structural element qualifying as the special technical feature that defines a contribution over the prior art, see columns 15-16 of Smith's US 6,878,830. Smith's discloses similar boron compounds as the instant invention. Accordingly, unity of invention is considered to be lacking and restriction of the invention in accordance with the rules of unity of invention is considered to be proper. Furthermore, even if unity of invention under 37 CFR 1.475(a) is not lacking, which it is lacking, under 37 CFR 1.475(b) a national stage application containing claims to different categories of invention will be considered to have unity of invention if the claims are drawn only to one of the following combinations:

- (1) A product and a process specially adapted for the manufacture of said product', or
- (2) A product and a process of use of said product; or
- (3) A product, a process specially adapted for the manufacture of the said product, and a use of the said product; or
- (4) A process and an apparatus or means specifically designed for carrying out the said process; or
- (5) A product, a process specially adapted for the manufacture of the said product, and an apparatus or means specifically designed for carrying out the said process.

And, according to 37 CFR 1.475(c)

if an application contains claims to more or less than one of the combinations of categories of invention set forth in paragraph (b), unity of invention might not be present.

However, it is noted that unity of invention is considered lacking under 37 CFR 1.475(a) and (b). Therefore, since the claims are drawn to more than a product, and according to 37 CFR 1.475 (e)

the determination whether a group of inventions is so linked as to form a single general inventive concept shall be made without regard to whether the inventions are claimed in separate claims or as alternatives within a single claim.

The claims lack unity of invention and should be limited to only a product, or a process for the preparation, or a use of the said product. In the instant case, Groups I-III are drawn to various processes of making various products (i.e., claim 1 or 2), and the final products do not contain a common technical feature or structure, and do not define a contribution over the prior art, i.e., similar boron compounds. Moreover, the examiner must perform a commercial database search on the subject matter of each group in addition to a paper search, which is quite burdensome to the examiner.

Claims 1 and 3-11, in part, embraced in above elected subject matter, are prosecuted in the case. Claims 1 and 3-11, in part, not embraced in above elected subject matter, and claim 2 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention.

The requirement is still deemed proper.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 3-11 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an iridium-containing catalyst represents compounds of formula (X) and a ligand represents compounds of formula (XI), does not reasonably provide enablement for the iridium-containing catalyst or the ligand without limitation, see claim 1. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. Dependent claims 3-11 are also rejected along with claim 1 under 35 U.S.C. 112, first paragraph.

In *In re Wands*, 8 USPQ2d 1400 (1988), factors to be considered in determining whether a disclosure meets the enablement requirement of 35 U.S.C. 112, first paragraph, have been described. They are:

1. the nature of the invention,
2. the state of the prior art,
3. the predictability or lack thereof in the art,
4. the amount of direction or guidance present,
5. the presence or absence of working examples,
6. the breadth of the claims,
7. the quantity of experimentation needed, and
8. the level of the skill in the art.

In the instant case:

The nature of the invention

The nature of the invention is a process for preparing compounds of formula (V) or (VI), wherein the iridium-containing catalyst or the ligand is not limited (i.e., no named formula), see claim 1.

The state of the prior art and the predictability or lack thereof in the art

The state of the prior art is that a similar catalyst, wherein the ligands represent phosphorus organic ligands (e.g., Pme_3 , dmpe or dppe), see column 2 of Smith's US 6,878,830.

The amount of direction or guidance present and the presence or absence of working examples

The only direction or guidance present in the instant specification is the example compounds of formula (X) or (XI) on pages 21-22 of the specification. There is no data present in the instant specification for the organic substrate other than compounds of formula (X) or (XI).

The breadth of the claims

The instant breadth of the rejected claims is broader than the disclosure, specifically, the instant claims include a process for preparing compounds of formula (V) or (VI), wherein the iridium-containing catalyst or the ligand is not limited (i.e., no named formula).

The quantity or experimentation needed and the level of skill in the art

While the level of the skill in the chemical arts is high, it would require undue experimentation of one of ordinary skill in the art to resolve any iridium-containing catalyst or ligand other than formula (X) or (XI). There is no guidance or working examples present for constitutional any process for the oxidation of an organic substrate, wherein the iridium-containing catalyst or ligand is not limited. Incorporation of the limitation of the iridium-containing catalyst or ligand (i.e., formula (X) or (XI)) into claim 1 would overcome this rejection.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

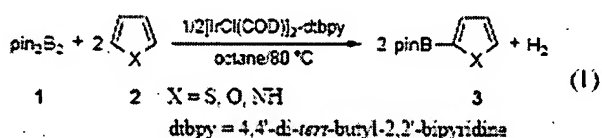
6.1 Claims 1 and 3-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Takagi et al. publication, Tetrahedron Letters, 2002, 43:5649-5651.

Applicants claim processes of making compounds of formula (V) or (VI) by reacting compounds of formula (I) with compound of formula (III) in the presence of an iridium-containing catalyst and a ligand, wherein the variable X of formula (VI) represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z of formula (VI) independently represents –CH= thereof, see claim 1. Dependent claims 3-11

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further limit a number of reaction conditions, i.e., the ligand is a compound of formula (XI).

Takagi et al. disclose processes of making heteroarylboronates compounds by reacting pin_2B_2 (i.e., formula (III)) with heteroaromatic substrates (i.e., formula (I)) in the presence of $[\text{IrCl}(\text{COD})_2]_2$ -(4,4'-di-tert-butyl-2,2'-bipyridine) (i.e., iridium-containing catalyst and a ligand). A reaction scheme has been particularly exemplified, i.e.,



, see pages 5649-5650. Therefore

Takagi et al. processes clearly meet the required elements of the instant invention.

Dependent claims 3-11 are also rejected along with claim 1 under 35 U.S.C. 102(b).

6.2 Claims 1 and 3-11 are rejected under 35 U.S.C. 102(a) as being anticipated by Tagata et al. publication, *Advanced Synthesis & Catalysis* (2004), 346(13-15):1655-1660.

Applicants claim processes of making compounds of formula (V) or (VI) by reacting compounds of formula (I) with compound of formula (III) in the presence an iridium-containing catalyst and a ligand, wherein the variable X of formula (VI) represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z of formula (VI) independently represents $-\text{CH}=$ thereof, see claim 1. Dependent claims 3-11 further limit a number of reaction conditions, i.e., the ligand is a compound of formula (XI).

Tagata et al. disclose processes of borylation of aromatic and hetero-aromatic

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compounds (i.e., indole) with bis(pinacolato)diboron or pinacolborane, and the reaction is catalyzed by a $1/2$ $[\text{IrCl}(\text{COD})]_2$ -bipyridine complex (i.e., compound 6a or 6b), see reaction schemes in the Table 5 on page 1658. Therefore Tagata et al. processes clearly meet the required elements of the instant invention. Dependent claims 3-11 are also rejected along with claim 1 under 35 U.S.C. 102(a).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

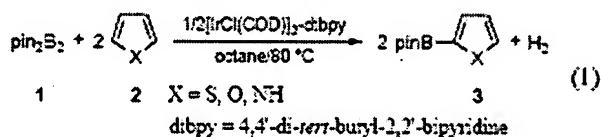
7.1 Claims 1 and 3-11 are rejected under 35 U.S.C. 103(a) as being obvious over Takagi et al. publication, Tetrahedron Letters, 2002, 43:5649-5651.

Applicants claim processes of making compounds of formula (V) or (VI) by reacting compounds of formula (I) with compound of formula (III) in the presence of an iridium-containing catalyst and a ligand, wherein the variable X of formula (VI) represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z of formula (VI) independently represents $-\text{CH}=\text{}$ thereof, see claim 1. Dependent claims 3-11 further limit a number of reaction conditions, i.e., the ligand is a compound of formula (XI).

Determination of the scope and content of the prior art (MPEP §2141.01)

Takagi et al. disclose processes of making heteroarylboronates compounds by reacting pin_2B_2 (i.e., formula (III)) with heteroaromatic substrates (i.e., formula (I)) in the presence of $[\text{IrCl}(\text{COD})_2-(4,4'\text{-di-tert-butyl-2,2'-bipyridine})]$ (i.e., iridium-containing catalyst and a ligand). A reaction scheme has been particularly exemplified, i.e.,

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, see pages 5649-5650.

Determination of the difference between the prior art and the claims (MPEP

§2141.02)

The difference between the instant claims and Takagi et al. is that the instant processes use compounds of formula (III) or (IV) as starting materials, while Takagi et al. use compound of formula (III) as starting materials. Takagi et al. processes overlap with the instant invention.

Finding of prima facie obviousness-rational and motivation (MPEP §2142-2143)

One having ordinary skill in the art would find the instant claims 1 and 3-11 prima facie obvious **because** one would be motivated to employ the processes of Takagi et al. to obtain the instant processes for preparing compounds of formula (V) or (VI) by reacting compounds of formula (I) with compound of formula (III) in the presence of an iridium-containing catalyst and a ligand, wherein the variable X of formula (VI) represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z of formula (VI) independently represents $-\text{CH}=$ thereof. Dependent claims 3-11 are also rejected along with claim 1 under 35 U.S.C. 103(a).

The motivation to obtain the claimed complexes derives from known Takagi et al. processes would possess similar yields to that which is claimed in the reference.

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7.2 Claims 1 and 3-11 are rejected under 35 U.S.C. 103(a) as being obvious over Tagata et al. publication, Advanced Synthesis & Catalysis (2004), 346(13-15):1655-1660.

Applicants claim processes of making compounds of formula (V) or (VI) by reacting compounds of formula (I) with compound of formula (III) in the presence of an iridium-containing catalyst and a ligand, wherein the variable X of formula (VI) represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z of formula (VI) independently represents $-\text{CH}=\text{}$ thereof, see claim 1. Dependent claims 3-11 further limit a number of reaction conditions, i.e., the ligand is a compound of formula (XI).

Determination of the scope and content of the prior art (MPEP §2141.01)

Tagata et al. disclose processes of borylation of aromatic and hetero-aromatic compounds (i.e., indole) with bis(pinacolato)diboron or pinacolborane, and the reaction is catalyzed by a $1/2 [\text{IrCl}(\text{COD})]_2$ -bipyridine complex (i.e., compound 6a or 6b), see reaction schemes in Table 5 on page 1658.

Determination of the difference between the prior art and the claims (MPEP §2141.02)

The difference between the instant claims and Tagata et al. is that the instant processes are operated in the presence of an iridium-containing catalyst and a ligand, while Tagata et al. use similar catalyst containing bipyridine as the ligands. Tagata et al.

processes overlap with the instant invention.

Finding of prima facie obviousness-rational and motivation (MPEP §2142-2143)

One having ordinary skill in the art would find the instant claims 1 and 3-11 prima facie obvious **because** one would be motivated to employ the processes of Tagata et al. to obtain the instant processes for preparing compounds of formula (V) or (VI) by reacting compounds of formula (I) with compound of formula (III) in the presence of an iridium-containing catalyst and a ligand, wherein the variable X of formula (VI) represents oxygen, sulfur atom or an imino group thereof, the variable Y or Z of formula (VI) independently represents -CH= thereof. Dependent claims 3-11 are also rejected along with claim 1 under 35 U.S.C. 103(a).

The motivation to obtain the claimed complexes derives from known Tagata et al. processes would possess similar yields to that which is claimed in the reference.

Claim Objections

8. Claims 1 and 3-11 are objected to as containing non-elected subject matter, i.e., the variable Y or Z independently represents -N= , etc.

9. Claims 1 and 3-11 are objected to because of the following informalities: i.e., there are symbols "(" or ")" in the limitation of the variable X, Y, Z, A, or $\text{R}^1\text{-R}^7$, e.g., see line 5 of claim 1. Replacement of the symbol "(" or ")" with a symbol "," would obviate the objection.

Conclusion

Any inquiry concerning this communication or earlier communications from the

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examiner should be directed to Rei-tsang Shiao whose telephone number is (571) 272-0707. The examiner can normally be reached on 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph K. McKane can be reached on (571) 272-0699. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rei-tsang Shiao, Ph.D.
Patent Examiner
Art Unit 1626

July 11, 2007